RURAL WORKFORCE 2000:
SKILL UPGRADING AND THE RURAL ECONOMY, 1970-2000

November, 1990

Revised May, 1991

Revised again with final tables June, 1991

Ruy A. Teixeira
Economic Research Service
U.S. Department of Agriculture

Lawrence Mishel
Research Director
Economic Policy Institute

I. Introduction

Should more education be the focal point for rural development efforts? Recent analyses of the role of education in rural areas in the 1970s and 1980s strike a note of pessimism in this regard. Killian and Parker (RDP, October-January, 1991) were not able to find a significant effect of local educational levels on economic growth in nonmetro areas. Similarly, a detailed analysis of education supply and demand by McGranahan and Ghelfi suggested that weak demand for highly educated workers in rural areas has been a much more serious problem than a poor supply of workers with adequate educational credentials. A close look at the data, in short, casts considerable doubt on the efficacy of higher rural educational levels, by themselves, as a strategy for rural development.

But what if the demand for education is about to skyrocket? Under such circumstances, enhancing rural educational levels might be a more viable focus for rural development efforts. In other words, education may not have been the answer in the recent past, but perhaps it will be in the future.

There is a certain conventional wisdom that supports this viewpoint, running roughly as follows. In the 1990s, the movement toward a "service economy" will accelerate, producing substantial increases in the numbers of skilled jobs for workers. There will be a serious problem, however. This is because, on the one hand, the slow-growing labor force will be increasingly

dominated by disadvantaged workforce entrants with low skill levels while, on the other, the skill levels of jobs will increase substantially as described. The result, according to this line of analysis, will be a skills mismatch between available jobs and available workers.

But--so this conventional wisdom runs--the skills mismatch itself will provide a great opportunity. If minorities and other disadvantaged workers (by virtue of group, geographical area, etc.) lack the requisite skills to compete in the "new economy," then providing them with the education they currently lack will rectify the problem. Once this is done, such disadvantaged workers will be in great shape, since the shortage of adequately-skilled workers will guarantee them access to the many highly-skilled jobs being created.

Whatever its merits, this has become a very popular story. It has been the subject of innumerable press accounts (see, for example: Business Week September 19, 1988 "Needed: Human Capital"; Wall Street Journal June 29, 1989 "A Centennial View"; Washington Post August 6, 1989 "Education at Work"; New York Times September 25-27, 1989 "Skills Vs. Jobs"; and Wall Street Journal, February 9, 1990, "Education: The Knowledge Gap"). It has also been the view of the Department of Labor under Presidents Reagan and Bush, a view based on the widely disseminated Workforce 2000 report (Johnston and Packer, 1987), prepared by the Hudson Institute for the Department. In general, it establishes the context within which almost all policy

discussions of education and training currently take place.

The application of this viewpoint to rural areas is straightforward. Since the skills required for jobs are going up dramatically and since rural workers tend to have relatively low educational levels, the skill levels of rural workers must be upgraded to match the skill levels of available jobs. Then, once the "human capital" of rural workers is adequately upgraded, rural development will follow, since employers will be actively seeking supplies of skilled labor.

We might call this the "supply-push" theory of rural development. As the name implies, it presupposes that the demand-side conditions for rural development are coming into being. The problem will lie instead on the supply side, with the chronic deficit of human capital in rural areas. This deficit will prevent rural development, by keeping skill-hungry employers from expanding operations or moving in from other areas. What is needed, therefore, is a "push" from the supply side, through the massive upgrading of the rural workforce.

II. National Trends in Skill Upgrading

The supply-push theory that touts education as the key to rural development is built on the premise that we are, in fact, moving rapidly into a high skill economy. To the extent that estimated national trends in skill upgrading do not support this

premise, the case for the supply-push theory is weakened. These national trends are summarized below.

To begin with, data on historical trends in job skill requirements do not suggest rapid movement into a high skill economy. A recent study by D.R. Howell and E.N. Wolff analyzed the effects of both industry and occupation shifts (see box on "Measuring the Effects of Structural Change") on job skill levels between 1960 and 1985, using a job structure matrix of 267 occupations and 64 industries. Their research found that, while structural upgrading of job skill levels took place in each decade (1960-1970, 1970-1980, 1980-1985), the rate of increase declined substantially over time. For example, the "substantive complexity" of jobs (see box on data) went up .69 percent per year in the sixties, .46 percent per year in the seventies, and only .28 percent per year in the eighties (Table 1), split about evenly in each decade between occupation and industry shift effects. These results hardly suggest an impending explosion of skill upgrading from structural change.

TABLE 1
The Effect of Industry and Occupation Employment Shifts on Substantive Complexity of Jobs, 1960-1985

Time Period	Annual Rate of Change (percent)	Ten Year Rate of Change[1] (percent)	Industry Component (percent)	Occupation Component (percent)
1960-1970	.69	7.1	55.2	44.8
1970-1980	.46	4.7	44.6	55.4
1980-1985	.28	2.8	49.9	50.1

[1] To facilitate comparison of time periods, data have been converted to ten year rates of change--the change that would have occurred if the annual rates of change in each time period had continued for a full ten years.

Source: D.R. Howell and E.N. Wolff, "Trends in the Growth and Distribution of Skills in the U.S. Workplace, 1960-1985", Industrial and Labor Relations Review, 44:3 (April 1991), Tables 3 and 5.

Box on "Measuring the Effects of Structural Change"

The effects of structural shifts (i.e., the changing distribution of occupations and industries within the economy) on skill levels are estimated by a technique called shift-share analysis. This technique holds skill levels constant within categories (e.g, the average skill levels of manual and professional jobs remain the same) and then estimates how much overall skill levels are changed just by the shifting job distribution across categories (e. g., the shift away from manual toward professional jobs). The "shift effect" on average skill levels may then be expressed as an annual rate of change, or, as we have done in most of our tables, as a ten year rate of change (the change that would have occurred if the annual rate of change for a given skill characteristic in a given time period had continued for a full ten years).

The occupation shift effects presented in Tables 2-5 are based on a shift share analysis of 11 major occupational groups from the Current Population Survey (CPS). Our analyses indicate that the basic results presented here are not sensitive to levels of aggregation (e.g, using a larger number of occupational categories). This was true when we compared estimated shift effects for the 1970s and 1980s using two different categorizations: a major CPS occupational categorization; and a categorization developed by McGranahan and Ghelfi with roughly twice as many categories. This was also the case when we

analyzed BLS occupation projections with both a CPS major occupation breakdown and a very detailed CPS forty-six category breakdown.

Data for the 1970 occupational breakdown were taken from the 1970 Census, data for 1979 from the March, 1979 CPS, data for 1980 for the 1980 Census and data for 1988 from the 1988 CPS Earnings file. Data for the 1988-2000 occupational breakdowns were taken from the 1988-2000 BLS projections, crosswalked into 11 major CPS occupational categories. Metro/nonmetro breakdowns by occupation for the 1988-2000 analysis were obtained from the 1988 CPS Earnings file and then applied to the national occupational distribution basd on the BLS projections.

********** **END BOX** **********

Box on "Measuring Skill Requirements"

The most common way of estimating skill requirements is to look at the education levels of job incumbents. That is, the average educational level of incumbents in a particular job is assumed to correspond exactly to the skill requirements of that job. This may or may not be true, so average education level is, at best, only a rough proxy for the skills actually needed on the job.

This is why it is desirable to look at direct measurements of job skill requirements. The best, and virtually the only, direct measurements of job skill requirements can be obtained from the Dictionary of Occupational Titles (DOT), a compendium of occupational titles in common use in civilian U.S. labor markets. This compendium is based on survey information collected at irregular intervals by job analysts for the U.S. Employment Services. A variety of information about each occupational title is contained in the DOT, including ratings of the educational development, training time, physical capabilities, temperaments and aptitudes necessary for the job. (For more information on how these ratings were constructed, including formal definitions and coding schemes, see the Handbook for Analyzing Jobs (U.S. Department of Labor, 1972).) There have been four editions of the DOT: 1939; 1949; 1965; and 1977 (a fifth is due out in 1991). The last of these contained information on some 12,855 different occupations.

The skill ratings for occupational groups in our analysis (Tables 2-5) were based on scores from the 4th edition. The specific indices we used from this edition were the three worker functions (handling data, people and things), two of the worker aptitudes (intellectual and verbal), the general educational development measure (GED) and the length of training or specific vocational preparation (SVP) measure. (The substantive complexity measure used by Howell and Wolff (Table 1) is a factor-analytic score created from a number of DOT variables: GED, SVP, handling data and several worker aptitudes.)

Aggregating from detailed DOT titles to occupational groups was done in the following manner. First, 4th edition scores for three-digit 1980 Census occupational codes were obtained from an ICPSR dataset put together by Paula England and Barbara Kilbourne. We then weighted the the scores for 1980 3-digit occupational codes into aggregated groups, using detailed occupational distributions drawn from the 1988 CPS annual averages.

The educational requirements of occupations were estimated by the standard practice of measuring the education levels of job incumbents (in this case, we used the median educational level within job categories. Education data were drawn from unpublished BLS tables based on the March 1988 Current Population Survey (CPS).

********** **END BOX** **********

In fact, based on historical trends, one would expect occupational upgrading in the 1990s to be less than that in the 1980s and 1970s, rather than more. This expectation was confirmed by our comparison of historical changes in skill levels (1970-1988) with projected future changes in skill levels (1988-2000) presented in Table 2. To ensure that we would not miss any possible evidence of an explosion in skill requirements, we looked at a very wide range of skill measures--seven direct measures of skill from the Dictionary of Occupational Titles (DOT), the proxy skill measure of years of schooling required, as well as level of education required, using four different educational categories.

TABLE 2
The Effect of Occupation Employment Shifts on Skill and Education Requirements, 1970-2000

Skill Indices	1970-1979	1980-1988	1988-2000
	(Ten Year Rates of Change*)		
Handling Data	4.01%	3.27%	1.46%
Verbal Aptitude	2.19	1.75	0.83
Length of Training	1.99	1.02	0.67
Intellectual Aptitude	2.02	1.46	0.69
General Educational Development (GED)	1.77	1.25	0.76
Handling People	1.93	1.99	0.80
Handling Things	-1.66	-2.69	-0.71
Education			
Median Years Required	0.91	0.55	0.42
Shares of Employment Requiring:	(Percentage Point Change*)		
Less than High School	-1.34	-0.80	-0.46
High School Graduate	-1.23	-1.24	-0.57
Some College	0.45	0.27	0.16
College Graduate or More	2.00	1.66	0.87

* To facilitate comparison of time periods, data have been converted to ten year rates of change--the change that would have occurred if the annual rates of change in each time period had continued for ten years.

Source: Authors' calculations.

These data show clearly that not only is the effect of future occupation shifts on job skill levels likely to be modest, but also that this effect will be smaller than in previous time periods. That is, when the 1970-1979 or 1980-1988 change rates are compared to the projected change rates for 1988-2000, the future change rates are typically around two-fifths to two-thirds of the historical rates. For example, job skill levels as measured by the verbal aptitude index went up at a ten year rate of 2.19 percent between 1970 and 1979 and a rate of 1.75 percent between 1980 and 1988, but are projected to rise in the future at rates only about half the 1980-88 rate and less than two-fifths the 1970-79 rate. Other skill measures show a similar pattern.

Overall, these data show that, contrary to the conventional wisdom on national skill trends, the move to a "service economy", in and of itself, is not likely to produce a highly skilled job structure. This is because occupational upgrading trends are not large enough to generate a substantial rise in job skill levels. Furthermore, projected rates of occupational upgrading actually appear to represent a slowdown from upgrading trends in the past, trends that were themselves fairly modest.

II. Comparing Rural and Urban Trends in Skill Upgrading

These results weaken the case for an education-based supply-push theory of rural development. If we are not moving into a high skill economy on the national level, general demand-side

conditions do not appear to favor a supply-driven rural development policy. Indeed, these results suggest that relatively weak demand for skilled workers might hold back rural development efforts, even if the supply of such workers in rural areas were substantially increased, as the supply-push approach advocates.

But perhaps demand-side conditions for growth in skilled jobs are better in rural areas than this national picture suggests. If so, the supply-push approach to rural development might still make sense. We examine this issue below, by comparing rural and urban skill requirement growth on the same set of indicators used for the national analysis. We also examine this growth under several different future scenarios, reflecting possible different relationships between rural and urban job growth in the 1990s.

Under the first scenario, we assume that growth rates in occupational categories in the future will be identical across rural and urban areas (for example, executive, administrative and managerial positions will grow as fast in rural as in urban areas, and so on). This is probably an optimistic assumption, given historical rural disadvantages in generating relatively high skill jobs.

The results for metro areas alone are shown in Table 3. They are fairly similar to the national trends shown in Table 2. We see modest growth in skill requirements in the 1970s, a slight slowdown in this growth in the 1980s, and then a dramatic plunge

in skill growth rates in the 1990s, to levels about one-half to one-third that of earlier decades. For example, general educational development (GED) job skill requirements went up at a ten year rate of 1.94 percent in the 1970s, slowed to 1.51 percent in the 1980s, and are projected to drop to just .72 percent growth for the 1988-2000 period, a rate less than two-fifths of that in the 1970s. This hardly suggests a situation where skill-hungry metro employers will be driven towards rural areas for skilled workers, even were such workers to be widely available there.

TABLE 3
The Effect of Occupation Employment Shifts on Skill and Education Requirements, 1970-2000
(METRO AREAS)

Skill Indices	1970-1979	1980-1988	1988-2000[1]
	(Ten Year Rates of Change[2])		
Handling Data	3.50%	3.16%	1.41%
Verbal Aptitude	1.69	1.49	.78
Length of Training (SVP)	2.22	1.35	.64
Intellectual Aptitude	1.56	1.23	.67
General Educational Development (GED)	1.94	1.51	.72
Handling People	1.57	1.82	.77
Handling Things	-2.20	-3.06	-.68
Education			
Median Years Required	1.23	.85	.41
Shares of Employment Requiring:	(Percentage Point Change[1])		
Less than High School	-1.08	-.66	-.41
High School Graduate	-1.16	-1.27	-.57
Some College	.39	.24	.13
College Graduate or More	2.06	1.82	.85

[1] 1988-2000 analysis is based on the assumption that metro and nonmetro growth rates within occupational categories will be the same in this time period--that is, projected growth is distributed so that metro and nonmetro growth rates by occupational category for the future are exactly equal.

[2] To facilitate comparison of time periods, data have been converted to ten year rates of change--the change that would have occurred if the annual rates of change in each time period had continued for ten years.

Source: Authors' estimates.

Table 4 shows the results for rural areas under the "equal growth" scenario. The historical data here are particularly interesting. In the 1970s, the decade of the "rural turnaround", rural growth rates in skill requirements of jobs generally exceeded those in urban areas. For example, verbal aptitude and GED grew at ten year rates of, respectively, 2.82 percent and 2.20 percent in rural areas, compared to 1.69 and 1.94 percent in urban areas.

TABLE 4
The Effect of Occupation Employment Shifts on Skill and Education Requirements, 1970-2000
(NONMETRO AREAS)

Skill Indices	1970-1979	1980-1988	1988-2000[1]
	(Ten Year Rates of Change[2])		
Handling Data	4.69%	.62%	1.49%
Verbal Aptitude	2.82	.40	.90
Length of Training (SVP)	2.17	.37	.72
Intellectual Aptitude	2.51	.16	.69
General Educational Development (GED)	2.20	.20	.87
Handling People	2.25	.68	.83
Handling Things	-1.27	-2.16	-.78
Education			
Median Years Required	.88	.18	.43
Shares of Employment Requiring:	(Percentage Point Change[1])		
Less than High School	-2.01	-.21	-.57
High School Graduate	-1.16	-.37	-.53
Some College	.84	.28	.24
College Graduate or More	2.11	.29	.86

[1] 1988-2000 analysis is based on the assumption that metro and nonmetro growth rates within occupational categories will be the same in this time period--that is, projected growth is distributed so that metro and nonmetro growth rates by occupational category for the future are exactly equal.

[2] To facilitate comparison of time periods, data have been converted to ten year rates of change--the change that would have occurred if the annual rates of change in each time period had continued for ten years.

Source: Authors' estimates.

This relationship changes dramatically in the 1980s. As the data in the second column of the table clearly show, rural areas experienced a tremendous slowdown in job skill requirements growth in the decade--rates generally less than one-fifth and, in some cases, less than one-tenth of those in the previous decade--in contrast to urban areas where job skill growth slowed down only slightly. For example, growth in handling data job skill requirements fell from a ten year rate of 4.69 percent in the 1970s to 1.62 percent in the 1980s, verbal aptitude growth from 2.82 percent to .40 percent and GED growth from 2.20 percent to just .20 percent. For these same indicators, growth in job skill requirements in urban areas declined only slightly between the two decades: from 3.50 percent to 3.16 percent; from 1.69 to 1.49 percent; and from 1.94 to 1.51 percent, respectively.

Thus, in the 1970s, during the "rural turnaround", rural areas participated fully in the modest overall growth in job skill requirements in the U.S.--in fact, actually outpaced urban areas. In the 1980s, however, rural growth in job skill requirements lagged very far behind urban areas, indicating that, far from full participation, rural areas were getting substantially less than their "fair share" (based on weight in the overall job structure) of the growth in relatively high skill jobs. The historical data, then, tell us that demand side conditions for growth in skilled jobs, not great even in urban areas, have weakened much more rapidly in rural areas.

The data in the last column of Table 4 show that, even under

the optimistic scenario of equal occupational growth rates across rural and urban areas, the 1990s hold little promise of an explosion of skill demand in rural areas. Indeed, these data show that future rural growth in job skill levels under this optimistic scenario, while representing an improvement over the extremely low-growth 1980's, would still lag far behind historical growth rates from the 1970's (or urban growth rates from the 1980's, for that matter). Verbal aptitude requirements, for example, are projected to rise at a 10 year rate of .90 percent (better than the 1980's rate, but less than one-third of the 2.82 percent growth rate during the 1970's), GED requirements at a rate of .87 percent (again, better than in the 1980's, but less than one-tenth of the 2.20 percent rate in the 1970's) and so on. Thus, even under generous assumptions, rural areas appear unlikely to generate the demand-side conditions upon which an eduation-based supply-push strategy could reasonably be based. Instead, the demand-side conditions themselves appear to be a serious problem.

And the situation could conceivably be much worse. Table 5 shows data for growth in skill requirements, 1988-2000, under two alternative scenarios. Under these scenarios, we assume that growth in occupations in rural and urban areas will be distributed not equally, as in our first scenario, but according to patterns in the last two decades. Scenario A, the more optimistic one, assumes that rural-urban growth among occupations will be distributed as in the 1970s; scenario B, much more

pessimistic, but probably most realistic of all the scenarios, assumes rural-urban growth will be distributed according to the 1980s pattern.

TABLE 5
The Effect of Occupation Employment Shifts on Skill and Education Requirements, 1988-2000
(ALTERNATIVE SCENARIOS)

Skill Indices	Scenario A[1]		Scenario B[2]	
	Metro	Nonmetro	Metro	Nonmetro
	(Ten Year Rates of Change[3])			
Handling Data	1.48%	2.09%	1.54%	.17%
Verbal Aptitude	.81	1.33	.82	.26
Length of Training (SVP)	.70	.91	.75	.17
Intellectual Aptitude	.69	1.06	.72	.04
General Educational Development (GED)	.75	1.24	.77	.17
Handling People	.84	1.02	.82	.24
Handling Things	-.81	-.62	-.66	-.58
Education				
Median Years Required	.45	.46	.44	.06
Shares of Employment Requiring:	(Percentage Point Change[3])			
Less than High School	-.39	-1.04	-.40	-.28
High School Graduate	-.64	-.52	-.63	-.05
Some College	.08	.55	.10	.23
College Graduate or More	.94	1.02	.93	.10

[1] Scenario A is based on the assumption that relative metro-nonmetro growth rates within occupational categories will be the same in the future as they were in the 1970's--that is, projected growth is distributed so that the ratios between metro and nonmetro growth rates by occupational category for the future duplicate the ratios prevailing in the 1970s.

[2] Scenario B is based on the assumption that relative metro-nonmetro growth rates within occupational categories will be the same in the future as they were in the 1980's--that is, projected growth is distributed so that the ratios between metro and nonmetro growth rates by occupational category for the future duplicate the ratios prevailing in the 1980s.

[3] To facilitate comparison of time periods, data have been converted to ten year rates of change--the change that would have occurred if the annual rates of change in each time period had continued for ten years.

Source: Authors' estimates.

The data from scenario A show that, even under this extremely optimistic scenario, the future rate of growth of skill requirements in rural areas, while better than under the equal growth rates assumption, still does not come close to historical growth rates observed in rural areas in the 1970's. This suggests that future growth in rural job skill levels, even under the most propitious of circumstances, will be rather sluggish--hardly amounting to an explosion of skill demand for which large numbers of skilled workers must be supplied.

The data from scenario B show just how serious the problem of weak skill demand in rural areas could be. Under this scenario, much more realistic than those previously discussed since it simply continues trends observed in the immediate past, the growth in skill requirements of rural jobs is anemic indeed. Verbal aptitude requirements, for example, are projected to grow at a ten year rate of .26 percent, while intellectual aptitude requirements would grow only .06 percent. It is hard to see how an exclusively supply-push strategy for rural development would make much sense in a context of such weak demand.

The conclusions that flow from these data are straightforward. To the extent these projections are accurate, there will be no demand-side explosion in job skills in the United States as a whole in the 1990s and, even under optimistic scenarios, none in rural areas. Rural areas, in fact, will be doing well to avoid a continuation of the slowdown in skill growth rates experienced in the 1980s.

IV. Conclusion

The analysis presented in this paper suggests that an education-based supply-push approach to rural development should be viewed skeptically. The most serious obstacle to rural development may, in fact, be on the demand-side. That is, even strenuous efforts to upgrade rural human capital seem unlikely to produce a big payoff for rural areas, if the availability of high skill jobs in these areas increases only slightly.

There are, however, two alternative interpretations of our data that might yield a more optimistic viewpoint. The first is that, while shifts in the distribution of occupations will not have big effects on job skill levels, upgrading within occupations or job content change will (see box, "How Much is the Content of Jobs Changing?). In this way, there might be strong growth in skill demand, despite the results presented earlier in this article.

Box on "How Much is the Content of Jobs Changing?"

Some say that changes within occupations--that is, changes in the content of task performance for a given type of job--are producing a highly-skilled job structure. For example, if computers are now employed extensively within an occupation (say, clerical or bank teller), while they weren't used at all 15 years ago, than the average skill level in that occupation may have changed dramatically over the 15 year period. If the number and magnitude of these within-occupation (content) changes have been sufficiently high, then substantial skill upgrading could be taking place within the economy, even while the effects of structural (distributional) changes are modest.

The problem with this line of argument is that we don't know the amount of content change that has taken place in the recent past, nor do we have a clear idea of how much is likely to take place in the future. One reason for this is that, while surveys like the decennial Census, Occupational Employment Statistics (OES) survey and the Current Population Survey (CPS) allow us to keep careful track of changes in industry/occupation distributions, changes in job content are not monitored anywhere near as closely. For example, while the CPS is done monthly and even the OES is conducted on a three year cycle, there has not been a new edition of the DOT--the only survey that tracks job content--since 1977. This and other data problems make it virtually impossible to track content change accurately at the

economy-wide level (as can be done with structural change).

Nor does the case study literature provide us with a clear window onto the direction and magnitude of within-occupation change. It does not tell us, for example, that where technological changes within occupations have been large, there have been substantial rises in skill levels--a relationship which, if true, would allow us to make some reasonable inferences about past and future content change.

On the contrary, the message of this literature on technological change might be summarized as: it depends. That is, there is no necessary relationship between technological progress and skill upgrading. The change in employment patterns due to a given technology can vary from large increases in skill levels to small increases to none at all or even downgrading. For example, cross-national studies of flexible manufacturing systems show essentially similar technologies being deployed in quite different ways in different countries.

The above suggests that the magnitude of recent job content change cannot be estimated with much precision and that we should be cautious in assessing the future direction of content change. Nevertheless, we believe that areas of overlap between three sources of information--the scholarly literature, journalistic accounts, and the accumulating testimony of the nation's business community--allow some limited conclusions to be drawn.

First, jobs today are more likely to require at least threshold levels of literacy and numeracy. Second, some jobs in

"best practice" firms within certain industries are being substantially upgraded (i.e., workers independently solve technical problems, learn new tasks on a fairly regular basis, interact with fellow workers as part of a "team", etc.). Third, such "best practice" firms that are not the norm in the U.S. economy today (though they are becoming numerically more important over time).

If our interpretation is accurate, much of the current talk about extensive job upgrading appears to represent a considerable exaggeration of the limited upgrading actually happening in contemporary workplaces. What accounts for this exaggeration? In our view, much of it is wishful thinking, where what is desirable is confused with what exists. People are aware of the potential of new information technologies and of the ways this potential is being tapped within workplaces by our economic competitors, view this as desirable, and assume U.S. firms must be moving down the same path. But the realities of technology adaptation, as outlined above, are much more complicated.

********** **END BOX** **********

The evidence favoring this interpretation is scant, however. In fact, a recent survey of employers conducted by the Commission on the Skills of the American Workforce found the reverse: only 5 percent of American employers believe education and skill requirements of jobs are rising significantly, while 80 percent say their primary concern is finding employees with a good work ethic and appropriate social behavior. Thus, while massive change in the content of jobs cannot be ruled out, there is little justification for making such an assumption at the current time (especially for policy purposes).

The second interpretation assumes that skill demand and supply are so intertwined that skill supply can, in essence, create its own demand. Thus, if skill demand is currently rising slowly (as our data suggest), then the solution is to rapidly increase skill supply (i.e. by pushing up educational levels), thereby encouraging employers to rapidly upskill jobs. This will lead, so the story goes, to generally higher skill demand, just matching the increase in skill supply.

We are skeptical that skill supply and demand equilibrate so nicely. In fact, the historical and empirical literature is replete with examples of the relative independence of skill demand and supply. Employers' decisions on workplace skill levels appear to be quite complicated, responsive to a range of factors that certainly includes the skill levels of available workers, but is by no means limited to that. Variation in contemporary US workplaces underscores this point, with certain

firms (e.g., Motorola, NUMMI, Honda) using relatively high skill forms of workplace organization, while employing workers with quite ordinary skill levels. In light of all this, the idea that the true key to increased skill demand is a simple increase in skill supply seems untenable.

Is more education completely useless then? No, on two counts. First, the data are clear that more education would probably help individuals in rural areas. That is, more education would undoubtedly help some rural individuals do well, or, at any rate, substantially better than they would do without it. However, the literature is also clear that more education makes individuals more likely to migrate out of rural areas. Thus, more education could have the paradoxical effect of helping rural individuals, but hurting rural places.

Second, if economic circumstances change, it is conceivable that rural areas could benefit substantially from higher education levels. This would be the case if the U.S. economy moves onto a "high skill, high wage" path during the 1990s, instead of continuing the economic course of the 1980s (as current trends indicate).

In such circumstances, rural educational upgrading could make sense, but only as a constituent part of policies designed to help rural areas generate the requisite demand for high skill workers. Such policies might include, for example, making rural areas more "urban-like", by providing the information infrastructure needed to support the relatively high skill

sectors of the economy. But whatever the specifics, we believe that demand-oriented policies stand a better chance, in the long run, of helping rural areas prosper than the currently fashionable and single-minded focus on upgrading the educational levels of rural workers.

For Additional Reading...

Bailey, T. 1989. "Changes in the Nature and Structure of Work: Implications for Skill Requirements and Skill Formation." Technical Paper No. 9. Columbia University: Conservation of Human Resources.

Costrell, R.M. 1988. "The Effect of Sectoral Employment Shifts on Wage Growth: 1948-1986." Preliminary Report to the Joint Economic Committee, U.S. Congress.

Howell, D.R. and E.N. Wolff. 1991. "Trends in the Growth and Distribution of Skills in the U.S. Workplace, 1960-1985." Skill Changes in the U.S. Labor Force, 1960-1985." Industrial and Labor Relations Review 44:3 (April).

Jaikamur, R. 1986. "Postindustrial Manufacturing." Harvard Business Review November-December: 69-76.

Johnston, W.B. and A.E. Packer. 1987. Workforce 2000: Work and Workers for the 21st Century. Indianapolis, IN: Hudson Institute.

Killian, M.S. and T.S. Parker. 1991. "Higher Education No Panacea for Weak Rural Economies." Rural Development Perspectives 7:1 (October-January).

McGranahan, D.A. and L.M. Ghelfi. Forthcoming. "The Education Crisis and Rural Stagnation in the 1980's." In Education and Rural Development: Rural Strategies for the 1990's, edited by R.W. Long. Washington, DC: Economic Research Service, U.S. Department of Agriculture.

Silvestri, G.T. and J.M. Lukasiewicz. 1989. "Projections of Occupational Employment, 1988-2000." Monthly Labor Review November: 42-65.

Spenner, K.I. 1988. "Technological Change, Skill Requirements and Education: The Case for Uncertainty." In The Impact of Technological Change on Employment and Economic Growth, edited by R.M. Cyert and D.C. Mowery. Cambridge, MA: Ballinger.

Teixeira, R.A. and P.L. Swaim. Forthcoming. "Skill Demand and Supply in the New Economy: Issues for Rural Areas." In Education and Rural Development: Rural Strategies for the 1990's, edited by R.W. Long. Washington, DC: Economic Research Service, U.S. Department of Agriculture.